

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
22 January 2004 (22.01.2004)

PCT

(10) International Publication Number
WO 2004/008444 A3

(51) International Patent Classification⁷: **G11B 7/135, 7/24**

(21) International Application Number:

PCT/IB2003/002726

(22) International Filing Date: 25 June 2003 (25.06.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 10 Jan 05
02077754.6 10 July 2002 (10.07.2002) EP

(71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 5621 BA Eindhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **VAN DER MARK, Martinus, B.** [NL/NL]; c/o Prof. Holstlaan, NL-5656 AA Eindhoven (NL); **PHILIPS, Gavin, N.** [GB/NL]; c/o Prof. Holstlaan, NL-5656 AA Eindhoven (NL).

(74) Agent: **DEGUELLE, Wilhelmus, H., G.**; Philips Intellectual Property & Standards, Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

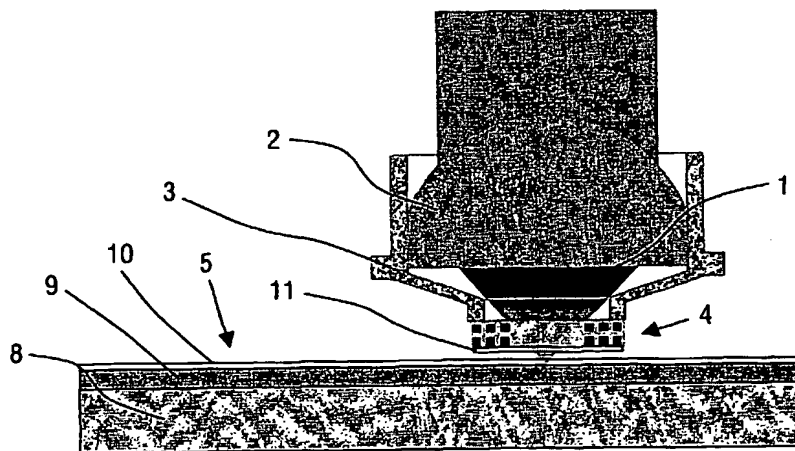
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,

[Continued on next page]

(54) Title: OPTICAL RECORDING AND READING SYSTEM, OPTICAL DATA STORAGE MEDIUM AND USE OF SUCH MEDIUM



(57) Abstract: An optical recording and reading system for use with an optical data storage medium (5) is described. The system comprises the medium (5) having a recording stack (9), formed on a substrate (8). The recording stack (9) is suitable for recording by means of a focused radiation beam (1) with a wavelength λ in air. The recording stack (9) has a first optical surface (6) most remote from the substrate (8). An optical head (3), with an objective (2) having a numerical aperture NA and from which objective (2) the focused radiation beam emanates (1) during recording, is (2) arranged on the recording stack (9) side of said optical data storage medium (5). The objective has a second optical surface (7) closest to the recording stack (9), and is adapted for recording/reading at a free working distance d_F of smaller than 50 μm from the first optical surface (6). At least one of the first optical surface (6) and the second optical surface (7) is provided with a transparent hydrophobic layer (10) that has a refractive index n and has a thickness smaller than 0.5 λ . In this way reliable recording and reading is achieved, specifically contamination build-up on the second optical surface (7) is prevented or counteracted.

BEST AVAILABLE COPY



MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Published:

— with international search report

— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:

8 April 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

PCT/IB 03/02726

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 G11B7/135 G11B7/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 G11B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 298 029 B1 (NAKAMURA KIMIO ET AL) 2 October 2001 (2001-10-02) column 3, line 60 -column 5, line 25; figures 1,2	1,4-7,11
Y	US 5 311 500 A (HIGUCHI MANABU ET AL) 10 May 1994 (1994-05-10)	1,4-7,11
X	column 2, line 24-30; figure 2 column 3, line 24 -column 6, line 16	8-10
Y	US 2002/015373 A1 (HAJJAR ROGER ET AL) 7 February 2002 (2002-02-07) paragraphs [0025]-[0027],[0042]-[0044]; figure 3A	4,5,7
X	US 2002/015914 A1 (FUKUI YUKIO ET AL) 7 February 2002 (2002-02-07) paragraphs [0082],[0083]	8-10
-/--		

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

8 October 2003

Date of mailing of the international search report

26. 01. 04

Name and mailing address of the ISA
 European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Stemmer, M

INTERNATIONAL SEARCH REPORT

PCT/IB 03/02726

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 406 569 A (TEIJIN LTD) 9 January 1991 (1991-01-09) page 4, line 51 -page 5, line 3 ---	1,4-11
A	US 4 983 505 A (HIGUCHI MANABU ET AL) 8 January 1991 (1991-01-08) column 3, line 24 -column 6, line 29 ---	1,4-11
A	GB 2 110 115 A (RCA CORP) 15 June 1983 (1983-06-15) page 2, line 53-78 ---	1,4-11
A	WO 02 49024 A (KONINKL PHILIPS ELECTRONICS NV) 20 June 2002 (2002-06-20) page 4, line 20 -page 13, line 6 -----	1

INTERNATIONAL SEARCH REPORT

PCT/IB 03/02726

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1, 4-11

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1,4-11

the first optical surface is provided with a transparent hydrophobic layer

2. Claims: 1-7

the second optical surface is provided with a transparent hydrophobic layer

INTERNATIONAL SEARCH REPORT

PCT/IB 03/02726

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 6298029	B1	02-10-2001	CN	1218254 A		02-06-1999
			EP	0919993 A2		02-06-1999
			JP	11224433 A		17-08-1999
			US	2001001607 A1		24-05-2001
US 5311500	A	10-05-1994	JP	1189048 A		28-07-1989
US 2002015373	A1	07-02-2002	US	6307832 B1		23-10-2001
			WO	0067252 A1		09-11-2000
US 2002015914	A1	07-02-2002	US	6340555 B1		22-01-2002
			CN	1183611 A ,B		03-06-1998
			EP	0844607 A2		27-05-1998
			JP	3231685 B2		26-11-2001
			JP	10228676 A		25-08-1998
			US	6132932 A		17-10-2000
EP 0406569	A	09-01-1991	JP	3142728 A		18-06-1991
			CA	2017284 A1		04-01-1991
			DE	69022497 D1		26-10-1995
			DE	69022497 T2		15-05-1996
			EP	0406569 A2		09-01-1991
			US	5093174 A		03-03-1992
			JP	2559871 B2		04-12-1996
			JP	3130947 A		04-06-1991
			JP	2541677 B2		09-10-1996
			JP	3156753 A		04-07-1991
US 4983505	A	08-01-1991	JP	2029947 A		31-01-1990
			JP	2525647 B2		21-08-1996
GB 2110115	A	15-06-1983	DE	3242315 A1		01-06-1983
			FR	2517100 A1		27-05-1983
			JP	1859842 C		27-07-1994
			JP	5061111 B		03-09-1993
			JP	58096593 A		08-06-1983
WO 0249024	A	20-06-2002	CN	1422428 T		04-06-2003
			WO	0249024 A1		20-06-2002
			EP	1346352 A1		24-09-2003
			US	2002122375 A1		05-09-2002